

TECHNICAL DEPT.

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# AVIATION

*The Oldest American Aeronautical Magazine*

MAY 7, 1928

Issued Weekly

PRICE 20 CENTS



A flight of Army pursuit planes flying over the Columbia River in Oregon.

VOLUME  
XXIV

## *Special Features*

Airplane Spruce  
The Fokker F-10  
The Velie M5 Aircraft Engine

NUMBER  
19

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**EDDIE Stinson** and **George Haldeman**, in their **Seisno Detroit plane**, powered by a **Wright Whetstone engine**, shattered all existing time records for continuous flight on Friday, March 30.

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### DOES YOUR AIRPLANE EARN?

If you consider airplane operation in terms of dollars and cents . . . if you figure your costs in relation to your income . . . if you want to profit by your investment . . . you will soon discover that the possibilities and performance of a Fairchild All-Purpose Cabin Monoplane are more profitable than the average low-priced open-cockpit sort of plane.

### HERE ARE THE FACTS

Comparison of the Operating Costs of a Fairchild Cabin Monoplane with the average low-priced airplane\*

INITIAL INVESTMENT		TOTAL OPERATING COSTS	
Standard 10-passenger cabin monoplane complying with War Reliance engine and other	\$15,000.00	Value, plane	Value, plane
Single-engine 10-passenger open-cockpit airplane with 100-hp engine	\$10,000.00	per hour	per hour
MONTHLY OPERATING EXPENDITURES		MONTHLY OPERATING COSTS	
1. Engine expenditures		1. Monthly expenditures	\$20.00
Expenditure on 100-hp engine—1,000 hrs. use	\$2.00	2. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
2. Fuel expenditures	\$1.00	3. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
3. Oil expenditures	\$1.00	4. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
4. Pilot hourly rate of pay	\$1.00	5. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
5. Pilot hourly rate of pay	\$1.00	6. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
6. Pilot hourly rate of pay	\$1.00	7. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
7. Pilot hourly rate of pay	\$1.00	8. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
8. Pilot hourly rate of pay	\$1.00	9. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
9. Pilot hourly rate of pay	\$1.00	10. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
10. Pilot hourly rate of pay	\$1.00	11. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
11. Pilot hourly rate of pay	\$1.00	12. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
12. Pilot hourly rate of pay	\$1.00	13. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
13. Pilot hourly rate of pay	\$1.00	14. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
14. Pilot hourly rate of pay	\$1.00	15. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
15. Pilot hourly rate of pay	\$1.00	16. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
16. Pilot hourly rate of pay	\$1.00	17. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
17. Pilot hourly rate of pay	\$1.00	18. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
18. Pilot hourly rate of pay	\$1.00	19. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
19. Pilot hourly rate of pay	\$1.00	20. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
20. Pilot hourly rate of pay	\$1.00	21. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
21. Pilot hourly rate of pay	\$1.00	22. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
22. Pilot hourly rate of pay	\$1.00	23. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
23. Pilot hourly rate of pay	\$1.00	24. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
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25. Pilot hourly rate of pay	\$1.00	26. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
26. Pilot hourly rate of pay	\$1.00	27. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
27. Pilot hourly rate of pay	\$1.00	28. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
28. Pilot hourly rate of pay	\$1.00	29. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
29. Pilot hourly rate of pay	\$1.00	30. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
30. Pilot hourly rate of pay	\$1.00	31. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
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54. Pilot hourly rate of pay	\$1.00	55. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
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56. Pilot hourly rate of pay	\$1.00	57. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
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61. Pilot hourly rate of pay	\$1.00	62. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
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63. Pilot hourly rate of pay	\$1.00	64. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
64. Pilot hourly rate of pay	\$1.00	65. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
65. Pilot hourly rate of pay	\$1.00	66. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
66. Pilot hourly rate of pay	\$1.00	67. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
67. Pilot hourly rate of pay	\$1.00	68. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
68. Pilot hourly rate of pay	\$1.00	69. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
69. Pilot hourly rate of pay	\$1.00	70. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
70. Pilot hourly rate of pay	\$1.00	71. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
71. Pilot hourly rate of pay	\$1.00	72. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
72. Pilot hourly rate of pay	\$1.00	73. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
73. Pilot hourly rate of pay	\$1.00	74. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
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76. Pilot hourly rate of pay	\$1.00	77. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
77. Pilot hourly rate of pay	\$1.00	78. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
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79. Pilot hourly rate of pay	\$1.00	80. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
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81. Pilot hourly rate of pay	\$1.00	82. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
82. Pilot hourly rate of pay	\$1.00	83. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
83. Pilot hourly rate of pay	\$1.00	84. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
84. Pilot hourly rate of pay	\$1.00	85. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
85. Pilot hourly rate of pay	\$1.00	86. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
86. Pilot hourly rate of pay	\$1.00	87. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
87. Pilot hourly rate of pay	\$1.00	88. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
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93. Pilot hourly rate of pay	\$1.00	94. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
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96. Pilot hourly rate of pay	\$1.00	97. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
97. Pilot hourly rate of pay	\$1.00	98. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
98. Pilot hourly rate of pay	\$1.00	99. Monthly expenditures on oil and fuel—100 hrs. use	\$10.00
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## AVIATION

*The Oldest American Aeronautical Magazine*

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The Oldest American Aeronautical Magazine

Vol. XXIV

MAY 7, 1928

No. 19

### One in a Million

THE DEATH of Floyd D. Bennett is not only remembered by all those who knew and admired him, but by the entire aeronautical world. It has been said that Bennett, possessed of exceptional flying skill, courage and loyalty to the cause, who have done the major part of the work in the task of saving aviation as a sport. From the day he enlisted in the Naval Air Service as an aviator cadet until the time he passed on to the human Valhalla, he devoted all of his effort and energy toward the development and progress of aviation in this country. The slowness of that development in all the years exemplified by the fact that, like those who went before him, Floyd Bennett in the space of a few short years rose from total obscurity to a well-earned place in the aeronautical pantheon.

Perhaps his greatest quality, and incidentally the one that led to his death, was his loyalty to the fraternity of the air. In an attempt to assist the crew of the Berkman getting their stricken plane off the frozen wastes of Greely Island, he left his bed in a Detroit hospital, where he had been confined with influenza, to accompany Earl Baldwin on an aerial relief expedition. His strength however was not as great as his splendid spirit and as a result he was forced to give up the venture. That was his last flight, his last superb contribution to the cause of aviation. Floyd Bennett has gone, but his memory he will always remain, just as Commander Byrd, his friend and chief, was described by a red man, fearless and true—one in a million.

### The Cost of Refinement

PRACTICAL EXPERIENCE rather than great engineering resources has been the important factor in designing most of our commercial planes. By watching what others did and by copying, improving or changing as what had already been built, America has produced a series of commercial aircraft which are remarkably cheap. Up to the time when the Department of Commerce started to demand stress analysis many of these planes were built and manufactured with practically no design to go by. The men who designed them often had little technical education besides that which they had given themselves.

The situation, however, has begun to change considerably. The Department of Commerce will not accept for its list a fitting "look" to be the right size, but it is not the size he based on stress analysis, which is actually the better way, provided that the stress analysis be not a risk. Also, the better performance demand of planes can only be brought about by refinements both aerodynamically and structurally. This means that

there can be no guess work with an allowance on the heavy side. Everything must be calculated down to the last detail. In the matter of the aerodynamic qualities, the question of weights and areas must be brought down to a fine point and this can only be done if the plane is aerodynamically engineered.

A few years ago an experienced flier with a good eye for proportions and a little engineering knowledge could design as good a plane as the next one, but this is no longer true. The present day designer must compete with the experience and with the scientific data which has been gathered through many years. To build a better plane than those which are flying today takes both genius and engineering knowledge. If some of those who desire to break into the aircraft field would only realize this they would save themselves much money and many valuable lives. The inexperienced aviator and even the trained engineer should certainly have his design checked over by a competent engineer, both aerodynamically and structurally before he tests it out.

### Reliability in Instruments

THERE HAS been a gradual realization that instruments are more to be trusted in bad flying weather than are the human senses. Most pilots naturally resent this and many of them even refuse to believe it. It takes a practical demonstration, either in a hooded plane or in a whirling chair, to prove to most pilots that they cannot maintain level flight by instinct and that they must either use the horizon or use the instruments. Even when it has been demonstrated to the pilot that instruments are more to be trusted in bad weather than his senses, he falls back on the argument that the instruments are unreliable and that many good pilots have had disastrous crashes because they had in the back of their minds the feeling that their instruments were not working as they should.

To some extent, especially in the past, this argument has had some truth. It is better to have no instruments at all than instruments which do not operate properly. It is up to the manufacturer to supply the best quality of instruments and it is up to the buyer to see that they are kept in proper operating condition. The best instruments built today are of such quality that they rarely get out of order, and as a rule they give a considerable amount of warning of impending trouble, so that if the pilot is careful he can tell whether his instruments need looking over in order to maintain them in good operating shape. If instruments do go bad the chances are nine out of ten that they are either of poor quality or that they have not been given the proper kind of maintenance.

# The Fokker F-10

First of Three 12 Passenger W.A.E. Planes is Powered With Three "Wasp" Engines and has a High Speed of 143 M.P.H.

WHAT IS believed to be the highest powered commercial airplane ever constructed in the United States was recently completed by the Atlantic Aircraft Corp. at Hawthorne Heights, N. J., for the Western Air Express. This plane, a Fokker monoplane designated as the F-10, is powered with three Pratt & Whitney 400 hp. Wasp engines. Following Fokker practice, it has a full centerline wing set where the fuselage houses a large passenger cabin. The F-10 carries 12 passengers and approximately 400 lb. of mail or cargo in addition to two pilots, fuel and oil tanks, and accessories. The disposable load is 4,000 lb. of which 3,642 lb. is pay load. With a gross weight of 11,500 lb., the plane has a high speed of 143 m.p.h. on three engines and 122 m.p.h. on two engines. It can climb 1,400 f.p.m. on three engines and 600 f.p.m. on two engines. It has a service ceiling of 18,000 ft. and a range of 406 mi.

## Constructed Under Equipment Loan

The plane is the first of three for the Western Air Express in operation between Los Angeles, Calif., and San Francisco, Calif. They were constructed under an equipment loan granted to the Western Air Express by the Government Fuel and Air Corps in an effort to develop a model airplane between these two cities. However, construction of the planes was not started until after Maj. C. C. Moody, operations chief of the transport company, had returned from a tour of the principal European airlines. After his return, the final specifications were drawn up and construction started. The planes were completed in record time, practically three months after the completion of engineering data. The entire work under the supervision of Alfred A. Ganser, senior project engineer for the Atlantic Aircraft Corp.

The coloring of the F-10, though quite simple, is distinctive. The wings, tail surfaces and engine nacelles are finished in silver, while the fuselage is red from the rear of the center engine compartment to the tail. The wood wing is protected

by coats of spar varnish pigmented with aluminum, with all fabric, such as the fuselage and tail surface covering, is protected by the standard dyeing process with a final flat red or black lacquer. Metal parts, such as the door sills of the fuselage structure, are protected by a red oxide primer.



Interior view of the cabin showing the seating arrangement and finished with black Eberly lacquer. However, the sides of the fuselage frame are exposed in the cabin, but are finished in aluminum.

The fuselage frame is constructed entirely of welded, air line steel tubing and, contrary to the general tendency to use chrome molybdenum, the structure is of 1020S low alloy steel. The tubes are oxy-acetylene welded together, and all members meeting concentrically. Joints are avoided except at critical points where a number of tubes are joined at points of concentrated loading; these points are reinforced

by pieces of sheet metal welded to the sides of the tubes. The side rails of the Western lines extending on to the back of the rear of the baggage compartment, behind the cabin. From there the tail of the fuselage is braced with wire. Double gussets are used to brace the wire looped through an angle of small diameter tubing welded in the corner of the joint. The trans-



Detailed view of the F-10 showing the center engine mount, fuel cockpit, baggage or radio compartment and other door.

ing of the side panels is not quite symmetrical because of a leg door on the left side at the rear of the cabin for the stairs of the passengers.

The door leads to a compartment directly behind the cabin. The right half of this is fitted as a lavatory, with a toilet, an air vent and a wash basin in the other. The wall is lined with a mirror, paper holder, and towel holder. A 30 gal. water reservoir is also provided. To screen the lavatory, there is a hinged door on the forward wall. This door serves a twofold purpose. It can be swung back dividing the compartment into two parts with the lavatory on one side and a passageway for the entrance to the cabin on the other, or it can be swung forward forming part of the rear wall of the passenger cabin and leading to the lavatory, baggage, or mail compartments. Behind the lavatory section is the baggage compartment separated by a full size hinged door. The rear of this compartment is fitted with two low, lateral partitions which form a box for mail pouches or small baggage. This complete section has a capacity of 140 cu. ft. which is ample for the amount of baggage that may be carried. It is finished with waterproof plywood and coated plated fittings, to make the cabin. Among these fittings are handle convenient in place for use to grasp for support, if need be.

## Passenger Cabin Rectangular in Shape

The passengers' cabin is large and free from all obstructions and baggage. It is rectangular in shape, 18 ft. 3 in. long, 8 ft. 3 in. high, and 5 ft. wide. Twelve heavily upholstered seats are provided, six on each side, with a wide aisle between. The seats are of rubber construction upholstered with gray velour. A pocket is provided in the back of each seat for the convenience of the passenger. Above and row of seats, near the ceiling, is a narrow shelf for dining or small baggage. Should it be desired to use the shelf for other purposes, the seats can easily be removed along a clear compartment of 305 cu. ft. capacity. To make the seat, the upper walls and ceiling are covered with white, while the lower walls, transverse, doors, and doors are of milky plywood. All fittings, such as the ash trays, table and seat, the four dome lights in the ceiling, the door handle, etc., are nickel plated. The cabin is exceptionally light and airy with glass windows at the sides extending the length of the cabin. The windows are of safety glass mounted

in frames so that they can slide longitudinally. Clamps are provided to prevent the glass from vibrating.

For use in cold weather, an exhaust heater is connected to the cabin from the center engine. In addition, the walls, ceiling and floor of the cabin are padded with Helson wool. This provides insulation against extreme temperatures outside, as well as deadening the noise of the engines. It is understood that a Pioneer air speed indicator and altimeter, fitted with large diameter dials, will be mounted on the forward wall of the cabin, in view of the passengers. In the forward wall there is a door leading to the pilot's cockpit that may also be used as an emergency exit from the cabin.

## Wing Structure Electrically Bonded

The pilot's compartment, in front of the passenger cabin, is exceptionally large with a door at the rear leading to the cabin and one on the right for entrance or exit to or from the plane. The two pilot's seats are set quite high with a space between them in line with the door to the passenger cabin. Below the seats is ample room for a radio compartment or for storage of additional baggage. Though no provision has been made for the utilization of this cabin, it is expected that before the plane is put into service radio apparatus will be installed. Provision has been made for storage of additional baggage by electrically bonding the wing structure. The ceiling of this compartment, which will be the floor of the pilot's cockpit proper, is of corrugated aluminum resting on steel tubes, extending across the fuselage. The rear tube, which also acts as a brace for the pilot's seat, supports a step to facilitate entrance to the cockpit from the cabin.

Above the step and between the seats is a single control column, hinged in the middle so that the upper and may be swung in front of either seat. It is fitted with a wheel and connected to cables that pass over pulleys at the wings. The hinges can be locked, fixing the wheel in front of either seat so that there is no tendency for it to change its position.



Pilot's cockpit showing control and instrument installations.

When the wheel is turned. Dual rubber pedals are provided, connected by cables to the rudder. The pedals are of the steering type and are supported from horizontal tubes behind the instrument board. Each pedal is fitted with knurled levers so that when the knurled is swung in place it produces the effect of moving the pedal for use by a person of small stature.

In addition, the pilot's seat on the left can be raised or lowered. The adjustment mechanism is of the Army type,

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Front quarter view of the three-engined (Wasp) Fokker F-10 built for Western Air Express.

# Airplane Spruce

Quality Sitka from the Pacific Northwest is Inspected Many Times Before Being Shipped to the Plane Manufacturers

By EDWARD M. MILLER

FROM THE Pacific Northwest, where spruce the nation's greatest stand of timber, comes the grade of Sitka spruce used in the manufacture of American and European airplanes. Adaptability of Sitka spruce for wing and fuselage construction is attested by the fact that a majority of American plane manufacturers are now using Sitka spruce in increasing quantities and have utilized this light, tough wood in a large percentage of recent trans-Atlantic and trans-oceanic record-breaking planes. By reported tests, weight considered, Sitka spruce surpasses all woods in length of fiber, strength of fiber, is the strongest, and the most free from hidden defects.

Selecting and manufacturing airplane Sitka spruce is far more difficult and painstaking than might be supposed. The fact that a tree may bear the Sitka spruce label does not imply that airplane spruce of the proper quality is contained within its towering trunk. Some trees will fail to yield a single stock of superior grade airplane stock and the best of selected logs will yield only five or ten per cent, high grade lumber. Airplane spruce, of the better grade, is manufactured with the same care given to the production of sound-boards for the finest American pianos, for violins, harps, and other musical instruments demanding spruce free from all imperfections.

Present centers of Sitka spruce export are Portland, Oregon, Tacoma, Washington, and Grays Harbor, Washington. By far the largest port of the best spruce is manufactured at the Grays Harbor district on the central Washington Pacific coast. Grays Harbor is the world's greatest lumber shipping port, the shipments last year totaling 1,615,000,000 board feet with a value of \$50,000,000.00. Tributary to Grays Harbor is the vast total of 55,000,000,000 board feet of stand-

ing timber, much of that being Sitka spruce on the Olympic Peninsula, Washington, where the government spruce forests centered during the World War. On the Olympic Peninsula is the nation's largest stand of uncut spruce. Outstanding among the famous airplane spruce manufacturing plants in the Pacific Northwest is the I. V. Co. Pine Manufacturing Co. mill at Hoquiam, Washington, on the



Packing airplane spruce at the Percy Mfg. Co. plant at Hoquiam, Wash.

Harbor. Sitka spruce is manufactured at Portland, Oregon. The Percy company is the chief specialized spruce manufacturing concern in the Pacific Northwest, was the first company to manufacture airplane spruce as a large scale, and now exports the percentage of the majority of American plane companies, as well as many European plane producing companies.

Production of airplane spruce at the Percy plant uses a natural outgrowth of the firm's production of spruce for musical instruments. The firm was established 25 years ago.

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Sorted Sitka spruce airplane spruce as present at the Percy Mfg. Co. plant.

# Design of Wing Beams

Stress Analysis of Commercial Aircraft, Chapter Number Nine

By PROFESSOR ALEXANDER KLEMIN

Senior Washington School of Aeronautics

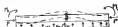
And GEORGE F. TITERTON

Staff of the Bureau of Aeronautics, Navy Department

WHEN A structural member is subjected to combined bending and compression, the stress at any section is the sum of the stresses due to bending and compression. It has been explained in Chapter 2 that when a web deflection under side load (or bending load), the compression and load increase the bending stress. The amount of the increase in bending stress in the compressive load  $P$  was the deflection  $y$  (Fig.). As the stress in stressed members more such as load  $P$  times the additional deflection increases the stress and deflection still more. This process until a point of equilibrium is reached. To determine the bending stress at this point of equilibrium, we have to use the Proctor Formulae, where  $w$  is recommended as agreed in all government departments.

Derivation of Proctor Formulae.

Fig. 61 shows a beam supported at its end points, carrying a uniformly distributed load of  $w$  pounds per inch, as well as compression of  $P$  pounds, and moments  $M$  and  $M'$  applied at the points of support.



Beam for Derivation of Proctor Formulae

Fig. 61

The equation for the moment at any point  $X$  is:

$$M = M' - \frac{wL}{2}X + \frac{wX^2}{2} - Py \quad (1)$$

Differentiating the expression twice with respect to  $X$  we have:

$$\frac{d^2M}{dX^2} = -w = -\frac{d^2Py}{dX^2}$$

Referring back to Chapter 2 we find that:

$$M = EI \frac{d^2y}{dX^2} \quad \text{or} \quad \frac{d^2y}{dX^2} = \frac{M}{EI}$$

Substituting above for  $\frac{d^2y}{dX^2}$  and transposing the  $P$  term:

$$\frac{d^2M}{dX^2} - \frac{PM}{EI} = -w$$

Now we write  $1/EI$  for  $F/(EI)$ , being an abbreviation for  $1/EI$ .

The complete solution of this differential equation is:

$$y = C_1 \cos(X/\lambda) + C_2 \sin(X/\lambda) + w/F \quad (2)$$

where  $C_1$  and  $C_2$  are constants of integration.

When  $X = 0$ ,  $M = M'$ , and when  $X = L$ ,  $M = M$ .

$M = C_1 + C_2 + w/F$  and  $M = C_1 \cos(L/\lambda) + C_2 \sin(L/\lambda) + w/F$ .

$$M' = C_1 \cos(0) + C_2 \sin(0) + w/F$$

$$M = C_1 \cos(L/\lambda) + (M' - w/F) \sin(L/\lambda) + w/F$$

$$C_1 = \frac{M' - w/F}{\cos(L/\lambda)}$$

$$C_2 = \frac{M - M' \sin(L/\lambda)}{\sin(L/\lambda)}$$

$$y = \frac{M' - w/F}{\cos(L/\lambda)} \cos(X/\lambda) + \frac{M - M' \sin(L/\lambda)}{\sin(L/\lambda)} \sin(X/\lambda) + w/F$$

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Continued on page 1296



**Kinner Airplane and Motor Co. Constructs  
A New Two Place Parasol Type Monoplane**  
"THE SPIRIT OF KILMER," new monoplane built by the Kinner Airplane and Motor Co. of Glendale, Calif., for Dr. F. C. Young, chairman of the Aeronautical Committee of the California Development Association, has been successfully flight tested according to word from Glendale.

Dr. Kinner himself made the initial test flight. The plane left the ground within 100 ft. It is said to have attained



Front quarter view of the new Kinner monoplane powered with a standard Kinner five cylinder radial engine.

a high speed of 130 m.p.h. and has a cruising speed at 120 m.p.h. In climb and general maneuverability it is said to have performed very well.

The Spirit of Kilmer is a parasol type monoplane. It is of open cockpit type and seats pilot and passenger, there being an exceptionally wide door to the passenger's cockpit making it possible to step from the ground directly up into the passenger compartment. The wings of this plane are of folding type permitting storage in a space 12 by 20 by 7 ft. Ward latches and provision for a wheel at the rear enable it possible to tow along ordinary streets when the wings are folded. The standard Kinner 5 cylinder radial is the power plant used on this plane.

#### Direct Air Mail Routes to be in Operation

In 35 of the States by the End of June  
BY JUNE 30 three quarters of the States are expected to be served by air mail lines, according to routes scheduled for sale from May by the Aeronautics Branch, Department of Commerce. Direct air mail service will be available in 35 of the States, it is said.

Twenty-six States already are touched by the air mail lines, and five more will have routes passing through them beginning in May. Three states will be serviced shortly by routes already contracted for but not yet in operation, and one State now has been laid out.

States which have either air mail routes open in operation are: Washington, Oregon, Idaho, California, Nevada, Utah, Colorado, Wyoming, Nebraska, Iowa, Texas, Oklahoma, Kansas, Illinois, Minnesota, Wisconsin, Tennessee, Indiana, Ohio, Pennsylvania, Maryland, New York, Massachusetts, New Jersey, Connecticut, and Missouri.

States which have either air mail routes to begin operation in May are: Alabama, Georgia, South Carolina, North Carolina, Virginia, and the District of Columbia. States which have either air mail routes but not operating are: Kentucky, Florida, and Missouri. Bids have been asked by Tennessee for the operation of an air mail line, and it is expected that Tennessee will shortly be added to the list.

#### Gillis Aircraft Corp. Builds Plane Designed by Professors at University of Michigan

A NEW cabin biplane has been designed by Prof. Robert A. Stiller and L. V. Kerker, members of the aeronautics engineering department of the University of Michigan at Ann Arbor, for the Gillis Aircraft Corp. of Battle Creek, Mich. The firm "Grasshopper," as the plane is named, was recently given its first flight in Battle Creek before Henry A. Fessenden, engineering inspector for the Department of Commerce. It pre-empted the manufacturer on the plane's steady on stream and performance.

This biplane is the first to be built in the City of Battle Creek. It will shortly be placed in production, it is said, it will cost approximately \$8,000. The biplane is a four place model powered with the Ryan-Benson nine cylinder air radial engine.

The plane fully loaded weighs 2,400 lb. It has a cruising radius of some 520 mi., and a service ceiling of 11,000 ft. The cabin is colored on either side of the plane through a rectangular door constructed by hinging of any sort. The rigidity of the fuselage about the door is maintained by a simple framing design, genuine leather is used on the sides of the interior and the main section, which is of unbreakable glass. Dual controls are provided. Both side and cockpit may be heated during cold weather flying, and provision is made for 100 lb. of baggage.

An Aviator goes to press, Capt. Gillis of the Battle Creek company is preparing for a cross-country flight to San Diego, Calif., in the new Grasshopper. After flying to Seattle, Gillis intends to return to Michigan by way of Minneapolis.

#### Aircraft Industries, Inc., Now Building New Three Passenger Cabin Monoplane

A NEW cabin monoplane, to be powered with a 250 hp. Curtiss engine, is being constructed in San Leandro, Calif., near Oakland Airport by Aircraft Industries, Inc. It is a three place externally braced, high wing design with solid non-tubular fuselage and wood wings. It is to be fitted with dual controls with a double seat in forward and a single seat in the rear. The entire construction is conventional, though a some detail it is quite original. The construction of 60 "Dural" as the plane is to be called, is being carried out by the engineers of Aircraft Industries, Inc., namely A. L. Wild, Joe Long, and Joseph Berry.

#### Regarding the Make of Instruments in the On Colonel Lindbergh's New Ryan Brougham

THE article entitled "B. P. Mahoney Company Two Out a Special Brougham for Lindbergh" which appeared in issue 1335 of the April 26 issue of AVIATION, has made it possible to identify the manufacturer of the instruments on the plane. The tachometer, altimeter, air speed indicator, temperature gauge, air pressure and oil pressure gauges are all furnished by the Consolidated Instrument Co. of Astoria, N. Y. The turning lights and the instrument panel lights were also furnished by the Consolidated company.

#### Bush Flying Service of Vancouver, W.-H. Is Named Eagle Rock Airplane Distributor

THE BUSH Flying Service of Vancouver, Wash., is the best equipped Oregon distributor for Alexander Eaglerock, plane. Plans of that type will be ordered at once for distribution and for use in the Bush school. The company already has a few West and Travel Airc and all three will be well a contribution to give students a wider knowledge of flying.

#### Test Experimental Variable Camber Low Wing Monoplane at Mount Clemens, Mich.

AN EXPERIMENTAL variable camber, low wing monoplane was recently tested successfully at Mount Clemens, Mich. The plane is a closed cabin of considerable depth with full conventional wings. The advantages of a variable camber wing are fully displayed. The camber of the wing is increased by using both the leading and trailing edges hinged, so that the wing is required such as for take off or climb the camber can be dropped increasing the camber and thus the lift. For high speed conditions, where little resistance is desired, the surfaces are raised. These operations are controlled by a lever in the pilot's cockpit. The variable camber when raised from the fuselage to a point about one-third of the span of the wing while the remaining third is fixed in the portion between the spars. This fixed portion may be raised or lowered and in that way the desired may be obtained in flight. The plane is said to take off at 25 m.p.h. and attain a high speed of 105 m.p.h. Further details will be published in an early issue of AVIATION.

#### Bremen Fliers Feted in New York After Flying from Greenly in Ford Monoplane

AN AVIATOR goes to press, Capt. Hermann Kugel, Maj. James Plummer, and Marion von Harnfeld, east-west inter-Atlantic fliers, are being feted in New York City. Unable to fly to the captured Bremen from Greenly Island because of



Capt. Kugel, Major Plummer, and Marion von Harnfeld receiving the greetings of the people of New York City as they ride up Broadway in the City Hall.

trouble with the engine, the fliers left that stranded spot on foot and flew to Murray Bay, Quebec, in the Ford red and gold piloted by Bert Balaban.

From Murray Bay the three flew to Carleton Place, L. I. N. Y., in April 27, taking a train to Washington, D. C., the way they to fly a wreath on the flag of Floyd Bennett, the first pilot who died of pneumonia in Quebec.

On April 28, the three returned to New York by train via New York and heavy weather delayed Bert Balaban from flying to Bolling Field, Washington, to pilot them back home. But later the fliers have been the center of numerous cere-

monies and celebrations, receiving the applause of the New York populace. From New York City they plan to go to Philadelphia, Chicago, and other cities.

Special State of New York gift medals have been awarded the fliers in New York City and reports from Washington state that authorizations have been granted by bills passed by both Senate and House to President Coolidge to award Kugel, Plummer, and Harnfeld the Distinguished Flying Cross.

At this time it is not definitely known whether the fliers will be flown from Greenly Island or whether a ship will be dispatched to bring it back with the coming of warmer weather. After the fliers left Greenly, the engine was again tested and made to run. Repairs and making of grease to the engine, however, necessitate an overhauling. It is also possible that the mainshaft is slightly out of line as a result of the landing on the island.

#### Bill Is Passed by House Which Authorizes Leasing of Public Lands for Aviation Use

THE HOUSE of Representatives has passed a bill authorizing the leasing of public lands for aviation purposes. The Secretary of the Interior is thus given authority to lease to any state or county, municipality, township, or other legal subdivision of a state for aviation purposes any unoccupied public lands of the United States not in excess in any case 640 acres.

The bill provides: "That and lease shall be for a period not to exceed 25 yr. and in the discretion of the Secretary of the Interior the subject to a renewal for a like period on condition that a rental of such sum as the Secretary may fix per year for the use of said land and shall be paid to the United States. Provided, That Government departments and agencies operating aircraft shall always have first and exclusive use of said lands and, with the approval of the Secretary of the Interior, the right to erect and install upon said lands such structures and improvements as the heads of such departments and agencies may deem advisable, including facilities for maintaining supplies of fuel, oil, and other materials for operating aircraft, and that in case of emergency or in event that it shall be deemed advisable, the Government of the United States may assume absolute control of the management and operation of said lands for military purposes."

"The Secretary of the Interior is hereby authorized to grant easements, under such rules as he may prescribe, for the establishment of beach lights in aid of aviation upon any public lands of the United States, on terms of appropriate use, and may withdraw lands for such purposes. Provided further, That the fee or other charges for use of any such aviation field or any of the facilities or service by express contract, in agency of the United States Government shall be subject to review by the Secretary of Commerce."

#### Charles Frosch Named Project Engineer Of Atlantic Aircraft Corp. at Teterboro

CHARLES FROSCH, who has been connected with the International Motor Co. at Long Island City, N. Y., for the past five and one-half years, has resigned his position as engineer in charge of gas-electrician has design to join the engineering department of the Atlantic Aircraft Corp. at Teterboro Airport, Hackensack Heights, N. J., as project engineer. This marks Mr. Frosch's return to aviation engineering after he served in the United States Army in 1915, when he was employed by the Farnham Airplane Co. of Fresno, Calif., spending some time in Chicago on various aircraft developments, and then as inspector and associated engineer in the United States during the World War.

### Wm. Beardmore & Co., Glasgow, Scotland,

**Completes Largest of Military Airplanes**  
THE LARGEST military planes ever built were recently completed by Wm. Beardmore & Co. at Dunblair, Glasgow, Scotland. The "Infantry" is a biplane wing monoplane with an overall span of 136 ft. It weighs about 15 tons when fully loaded and is powered with three Rolls-Royce Condor engines, each developing 650 hp.

The Infantry is said to have been designed by Dr. Robert, the eminent German aviator. In construction it follows his usual practice of all metal construction with the covering of both wings and fuselage of flat sheet metal. Except for a few highly stressed fittings of steel, the entire



Newly built in Scotland, the Beardmore "Infantry" powered with three Rolls-Royce "Condor" engines, is the largest of military planes. Company the size of the main and landing gear wheel.

structure is of duralumin. The covering of the wings forms a tube or box which makes it into a rigid structure. This covering is laminated, with the member of laminations varying depending on the stress at that point. The wings have a very large dihedral angle and are supported by a single tension member from the lower part of the fuselage. On each side of the fuselage is a cantilever engine mount for one of the Rolls-Royce engines. The entire engine is in front of the wing, with the large, ground-down propeller in front of the leading edge. The undercarriage is mounted below these engines and only one pair of wheels is used. They are 7 ft. 6 in. in diameter and fitted with Dunlop type Speed tubes and pneumatic tires. The wheels, which were just landed, is approximately 50 tons. The wheels are fitted with brakes, which is an innovation in British design. A wheel type of tail that is employed.

#### Flettner Servo-Rudder Used

Before the plane was built there was a great deal of discussion as to its controllability. The control surfaces, like the rest of the plane, are all made up of rectangular sections and are of flat cantilever design. The rudder is balanced with a main bar type of balance, which is in line with the rudder post. It is fitted with a Flettner servo-rudder. This consists of a small auxiliary surface on the rear mounted on the main rudder. It is actuated by the rudder controls in the opposite direction to that in which it is desired to turn the main rudder. The structure deflects these auxiliary surfaces which in turn makes the main rudder. From the photograph it appears that the ailerons are fitted with a similar device.

On its first flight the Infantry was flown from Mortlachton Heath by Sq. Ldr. R. A. de Bessy Tidy, who was accompanied by a mechanic. The plane is said to have taken off after a run of approximately one quarter of a mile and was climbed to about 2,000 ft. The pilot then maneuvered gently for about 15 min. and brought it down. It is said to have stopped

pulling after a run of about 300 yd. Presumably, the plane was lightly loaded, and because of the enormous size, made very slowly. The figures are available at the time in the detailed weights, performance figures, or a motor. The average weightings are said to be 12 ft. 2 in. deep and 10 in. wide 20 passengers.

### Newly Formed Commercial Air Transport Of Rochester Is Challenger Plane Agent

A NEW company, the Commercial Air Transport, Inc., has been formed in Rochester, N. Y. Edward J. Doyle is president, Otto Linderton, business manager, and Dr. Herbert Roberts is the secretary.

The new concern will operate Commercial Airplane, a full sized five miles west of the city, and will act as agent for the Challenger planes manufactured by the Knickerbocker company of Hagerstown, Md.

The airport, 50 acres of land and entirely devoted to air has an eight plane hangar with offices, locker room, rest room, and parts room. A gasoline tank and pump are also been installed. Two planes will be available at all times for express and passenger service to all parts of the state. The city office of the company are at No. 376 State St.

### E. B. Meyrowitz Now Offers No. 7 Luxor Goggles to the Commercial Aviation Trade

NO. 7 LUXOR Goggles, E. B. Meyrowitz, Inc., manufacturers, are now being offered to the commercial aviation industry. The goggles, the U. S. Air Service Model, are manufactured but year under contract with the Government.

The goggles have two major patented features. The lens contains the new shock type adjustment whereby the lens may be fitted to the spread of the eyes, and special optical rod through rubber cushions enable the pilot to fit the goggles comfortably in the face, it is said, with positive protection against air escape.

### Coolidge Recommends New Appropriation For West Indies Air Mail Transportation

PRESIDENT COOLIDGE has recommended to Congress a supplemental appropriation of \$1,750,000 for carrying mail weekly by air route from San Juan, Porto Rico, to Santiago, Cuba by way of Santa Domingo and Port-au-Prince. The letter of the Director Lord of the Budget Bureau, approval of the appropriation and the Bureau believed that of special class mail from the United States to the center reached by the new route will directly be carried by air. The underlying calls for an extended period of air mail transport.

### Milwaukee Light Plane Club Sponsoring Small Plane Meet to be Held in August

PLANE ARE now being made by the Milwaukee Light Plane Club for the first national "buddy" plane contest which will be held in Milwaukee. The event will take place at the O'Hare Airport the last week in August if it has been announced.

As "the Milwaukee" race, which is to be held among all sorts of the country, is placed as one of the features of the meet. The 50 members of the club are to be at work on six planes now under construction in Milwaukee to be entered in the competition. Arthur Parker is president of the group and Ray Morrison is vice president.



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DISTRICT OF COLUMBIA  
Washington—Capital Airways, Inc.  
UTAH  
Salt Lake City—Hagopian Aircraft Sales



## The Advance Aircraft Co. TROY OHIO

## Aeronautic Division of Engineering Society

### To Hold Conference in Detroit June 28-29

ON JUNE 28-29 a national aeronautic meeting will be held in Detroit by the Aeronautic Division of the American Society of Mechanical Engineers. The conference will be under the auspices of the organization's Detroit section, which has arranged the meeting to coordinate with the Gordon Bennett International Balloon Race, the 1935 National Air Tour, and the Big Airplane Model League Convention and Tournament—all to be held at that time in Detroit.

The preliminary program of the engineers calls for technical sessions on transportation, wood in aircraft, design, airway developments, power plant, and international developments and military aviation. Engineering topics in physics are being arranged for the afternoon of June 28, while a banquet is planned for Thursday evening June 29 at which the internationally known participants of the above sessions will be present. Saturday is being given over to the exhibits to take place at Ford Airport.

The entire program is open to the public, and the technical sessions and banquet will be held at the Rock-Cedlar Hotel.

## Two Air Lines to Offer Amphibian Service Between Los Angeles and Catalina Island

TWO AIR LINES will be operating amphibious planes between Los Angeles, Los Angeles and Catalina Island this summer, according to recent announcements. Pacific Marine Airways, which has for seven years operated a flying boat service between Los Angeles Harbor and the island, now announces the purchase of two Sikorsky Amphibians. These, it is understood, will be put in service June 1 to be flown direct from Roger's Airport, the Marine will no longer be needed with the amphibious type planes.

In addition to this service, Western Air Express will offer daily service, according to the recent statement of Horne M. Henderson, president and general manager. It is said that two amphibians have already been ordered for this service, which will be started in about July 1. These planes will be flown from Van Field to Avalon Bay, Catalina Island, the time of flight over either route being set at about 35 min due the distance of 35 mi. The make of equipment to be used by Western Air Express has not yet been announced.

## More Machinery Installed in Kinner Plant To Meet the Growing Demand for Engines

MORE THAN \$100,000 worth of machinery has been installed in the Kinner engine factory at Glendale, Calif., within the past weeks in an effort to meet the growing demand for engines. Production is now approaching 500 engines per year and a greatly increased production schedule is in prospect, according to Mr. Kinner.

It is said that 25 Kinner engines have been sold as a direct result of the recent Detroit aircraft show. In addition to this, recent orders were received for 39 engines from the Gordon Aircraft Corp., Dallas, O., and for 50 engines to the West Coast Auto Body works of Los Angeles. The latter organization, it is understood, is to commence building light airplanes.

## Ten Colleges Enter Intercollegiate Races Scheduled for June 30 at Mitchel Field

ENTRIES OF 10 colleges have been received for the intercollegiate airplane races to be held at Mitchel Field, L. I. N. Y. on June 30. The American Aeronautical Engineering Corp. of New York and the National Aeronautic Association

are sponsoring the competition, and Oliver C. Leasing, president of the Leasing company, has donated each pilot to be awarded the winner of the event.

The colleges which have entered thus far are Harvard, the Massachusetts Institute of Technology, Pennsylvania State, Michigan, Georgia Tech., New York University, Cornell, and Brown.

## Von Hoffmann Flying School Lets Students Fly home for Last Few Instruction Hours

SINCE it has always been the ambition of the flying student to return to his home town via the air and "give the folks a thrill," a new training idea has been evolved by the Von Hoffmann Aircraft School of St. Louis. The school now allows some of its students who live near St. Louis to take their last few hours of cross-country flying instruction in a hop to their home town.

On each occasion, the flying student picks the place he flies over the town several times, and after lunch—approximately one to two hours—takes back to St. Louis. He himself is then ready for the praise and applause which the homecoming of an initiated aviator—unless he has not some variation of a German landing—necessitates the rest of the instructor to St. Louis by train.

## German Air Law Expert to Give Address in America on Legal Aspects of Aviation

A SERIES of addresses are to be delivered in the three States this summer on the legal aspects of aviation by Prof. Otto Schöndorfer of the Air Law Institute in Königsberg University, Germany. Professor Schöndorfer is regarded as an authority on legal aspects of aviation.

A special study of the laws governing aeronautics has been made at Königsberg by the faculty, which began work on this subject in 1924 under the direction of Professor Schöndorfer. Some 400 volumes on legal aviation are to be found in the institute's library. More than 2,000 air laws are now in force in various parts of the world, according to Professor Schöndorfer, who plans to codify these laws.

## Daily Richmond, Norfolk, Washington, and New York Air Service Will Begin June 1

RICHMOND, VA., Norfolk, Va., Washington, and New York are to have a daily air service, to begin about June 1, according to announcement by Thomas G. Abbott, manager in charge of the National Airways, Inc.

It is understood that corporate planes to operate on a regular schedule of a plane a day each way between the cities on the route, airplanes being used between Norfolk and Washington and land planes on other routes. Trial trips to Virginia Beach, it was also stated, are being planned.

## John A. Hambleton is Appointed Director of United States Aeronautical University

JOHN A. HAMBLETON, Baltimore, Md., member of the faculty, has been appointed a director of the United States Aeronautical University, according to an announcement of the United States Airport Association. Plans are under way which the University is to obtain an endowment of \$100,000. The interest on this sum would be used to establish an aeronautical school where flying will be taught and research work undertaken.



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## Last Minute Briefs

**Old City, Peru**, formally dedicated to commercial airport Saturday May 5. The day was made a city holiday. A banquet was held on the evening.

The **International Aircraft Corp.**, Akron, O., will shortly complete 25 of its model F-17 "International lightplane" lightplanes. Twenty-six of these planes are in order.

Extra state **dealership** for the Engstrom plane is now held by the Dakota Air Service, Inc., Kydon, S. D. Waco dealership for the western half of North Dakota is also held by the company.

**Alvin R. Robbins, Jr.**, 16 yr. old pilot, will shortly leave Atlantic City, N. J., in an Engstrom plane to tour the United States over a period of nine or 10 months. He will represent the Le France Mfg. Co. of Philadelphia, soap manufacturer.

**Thomas H. Boggs** has joined the Akron Airport Co., Inc., Akron, O., where he will be passenger and student work. Mr. Boggs was formerly associated with the Midwest Air Transport Co. at Madison, Wis. He is a Kelly Field graduate.

**Colonial Airways, Inc.**, has leased two acres of land from the City Commission of Newark, N. J., at the Port of Newark Airport, which is expected to be utilized by the company. The Colonial company plans to erect hangars on the site leased.

An **AVIATION** goes to press, Prof. Hugo Junkers, designer and builder of the planes which bear his name, is en route from Germany to America. Whether his journey is a business or pleasure trip is as definitely known at this time.

May 25, the day Lindbergh landed at Le Bourget, Andreane, Peru, on his trans-Atlantic flight last year, will be "Aviation Day" in St. Louis. A celebration is being arranged by the St. Louis Air Board.

Construction work has started on the new plant of the **Advent Aircraft Co.** of Tulsa, Ok. Work is expected to be completed by July. The plant site is on the recently acquired 100 acre flying field on the outskirts of the city.

The **Leasing Aeronautical Corp.** of New York City is now completing a government order for 26 C-45 amphibian planes to be used in Mississippi. Four of the planes have already been sent to Central America.

An investigation by the **American Railway Express Co.** is now available to additional West Coast cities under a recent contract between that company and the Pacific Air Transport Co.

That the services of **Leut. Robert G. Marshak** of the Reserve Corps, 42nd Pursuit Squadron, have been secured as chief instructor of flying is announced by the **American Aviation Co.** of Gary, Ind.

The **St. Joseph Valley Aviation Club** of South Bend, Ind., will hold its air meet Saturday and Sunday May 10-11 at its airport on and one-half miles northwest of the city. The club is now giving a year book entering the club's activities. A copy is to be mailed to every airport in the country.

The **Chicago Association of Commerce** is now distributing its booklet entitled "Chicago, the Aeronautical Center." The publication contains a survey of aeronautical activities in the metropolitan district during 1934 as well as maps and lists concerning the Chicago airports.

Tests are being made on the **General Electric Co.** turbines at Cleveland, O., on a 50 kilowatt light bulb for airport use. The new bulb, three feet high and 15 in. in diameter, is said to be the most powerful bulb, 50 kilowatt bulbs being the largest commercial lights made heretofore.

A 24 page illustrated booklet has been issued by the **East-West Airlines Co.**, Division of the Ford Motor Co. It contains the Ford-Stearns planes and the activities of the company. Information on how to organize an air line, and other general information, is also given in the book.

**Derry Brothers, Inc.**, manufacturer of aircraft engines, is announcing that **Herbert H. Lindbergh**, vice of the company's Philadelphia branch, has been appointed Eastern representative to have direct charge of all western district sales in the New York and Philadelphia branch territories.

The **Greene-Wingrove Agency Association** has the prospect of an air route between these two cities has been found at Oyster, N.Y. Lack of railway facilities between Oyster and Wingrove was cited as an indication the venture would be profitable.

**Arrangements** have been completed for the construction of an aerial bridge on Riverside Tower, La Salle and Webster streets, Chicago. The bridge will be owned and operated by the **Greenwich Street Investment Co.** It will stand 25 ft. above the sidewalk.

That **F. B. Ewer** has accepted a position as the **Berry Brothers, Inc.**, aircraft division as general superintendent is announced. Mr. Ewer was formerly connected with the **East-West Air Mfg. Co.**, the **Stearns Aircraft Corp.**, and the **General Aircraft Co.**

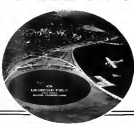
**A. H. Kessler**, president of the **Kessler-Bernard Aircraft Co.**, Inc., of Hagerstown, Md., manufacturer of Challenge planes, states that his company plans to increase its manufacturing facilities. A new building field was recently purchased on which to test new planes.

In his career as a pilot, **Col. Charles A. Lindbergh** has flown more than 290,000 mi. It was estimated when his record was set by **Transport Letter No. 66**. Colonel Lindbergh is reported to be over the age of 3,500 and his number of logs is 7,200.

**Five Stearns-Detector** and two **Trend Air** planes totaling a cost of \$60,000 have been sold in one week by the **Thompson Aeronautical Corp.** of Cleveland, O. **B. C. Marshall** did pilot and general manager of the company, was given great credit for the sales, which came at the time of the Detroit show.

**Colin McIntyre**, representative of the **N. Eastern Airlines Co.** of New York City, is using airplanes to cover his territory both for the purpose of saving time and for the increased attention that received from his account. The **Edwin Engstrom Aircraft Co.** of Spokane, Wash., is said McIntyre also services throughout Eastern Washington and Northern Idaho.

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way of the crankcase. In the rear is the gear case carrying the magnets, oil pump and tachometer drive.

The rear of the crankcase also houses the angle cone ring which actuates both intake and exhaust valves. The cone, which is driven by spiral gears, is in contact with the roller type valve lifter, operating in bronze guides. These lifters actuate the push rods which are connected at their upper ends to the rocker arms working on bronze linkages. Each rocker arm is mounted on a fitting on the cylinder head supporting the manifold on that side. Under the forward end of the rocker arms are flat helical springs with lightning bolts in the spring holder. The valves themselves are of aluminum steel, with both intake and exhaust valves of the same dimensions, namely 5 1/16 in. diameter with 11/32 in. stems. The stem operates in cast iron guides lubricated with graphite.

As has been mentioned above, each cylinder is provided with two AC spark plugs. Ignition is provided by two 30-watt magneto driven by spent gears, thus providing two independent sources of ignition. The ignition coils are cast into a tube behind the cylinders supported at intervals on the crank case. The coils have this tube and go to their respective spark plugs unconnected and unprotected. The manufacturer claims that every ignition trouble can be traced in this way. The engine is designed to take the standard mounting of the Biplane electric starter, which wire completely installed with battery weighs only 60 lb. This installation is optional and not provided as standard equipment.

Below the engine and mounted between the two lower cylinders is a North carburetor with the mixture passing from

The excess oil drains into a sump on the bottom of the crank case. This sump is fitted with a float valve which carries an oil temperature and over 125 deg. The oil pump, or scavenger pump, returns the oil to the oil supply tank, in which the cycle is repeated. Both of these pumps are the best, being of the gear type. The oil pressure can be kept



Crankcase and piston assembly of the Fiat 111

acted through an adjustable adjustment in the pressure pump. There are only two oil lines, one an inlet or suction line to the oiler, the other the outlet or scavenge line.

The general specifications of the Fiat 111, as supplied by the manufacturer, are as follows:

Number of cylinders	4
Cylinder arrangement	Radial
Cooling	By air
Bore and stroke	4 1/8 in. x 4 1/8 in.
Displacement	206.4 cu. in.
Compression ratio	15 to 1
Diameter of connecting rods	1 1/2 in.
Ground diameter of crankshaft	3 1/2 in.
Length, without starter	37 in.
Rated hp. at sea level	110
Rated speed	1500 rpm
Maximum hp.	120
Maximum speed	2000 rpm
Guaranteed fuel consumption at rated speed	55 lb./hr.
Guaranteed oil consumption at rated speed	6.25 lb./hr.
Weight dry, without starter and hub	210 lb.
Weight per rated hp.	2.01 lb./hp.

These figures have been included in the table of specifications on aircraft engines which appears monthly in AVIATION.



One piece master connecting rod and the four link rods assembled with pistons.

The carburetor spread through a rear fitted with a lever connected to the exhaust manifold of the two lower cylinders. The piston then pass in to a smaller ring manifold concentric with the outer line of the engine. The gases enter at the bottom and are distributed at five points to each of the cylinders. A fuel mixture control from the cockpit is provided so that the proper enrichment may be obtained at all altitudes.

Lubrication is by force feed through two pumps assembled into a single unit located in the rear under the accessory drive. One pump delivers oil under pressure from the oil tank to the oil collector ring, where it is forced through the center of the crankshaft to the crank pin and wrist pin bearings.

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Text on aerodynamics and its application to the design of aircraft. Includes a chapter on airfoil section and methods of determining lift and drag coefficients.

AIRCRAFT AERODYNAMICS by Lewis C. Howarth (1934) 100 pages \$ 2.50

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THE existence of Aero Shock Absorbing Struts affects your business whether you use them or not. Manufacturers offering them have an advantage over their competitors. Operators whose planes are equipped with them enjoy lower operation cost and greater passenger acceptance. Pilots who land on them have the safety and confidence of smoother, faster landings and comfortable taxing regardless of the condition of the ground.

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is due to the fact that our overloading is very large. To withstand this effect we may consider one strut point to be a point of inflection. Air forces pushing up on the overloading cause the beam rebound of the strut point to deflect downward. However, air forces are likewise acting up on the rebound of the strut point. These forces push about equal the overloading forces on our plane. Actually they are a little greater and as near the fuselage they cause the beam to deflect upward, putting the upper flange in tension as is

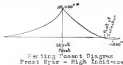


Fig. 54.

indicated by the fact that we have a negative moment. Moments on the front spar, high incidence, Case II, are graphically in Fig. 54.

The actual deflection of the front spar is illustrated in Fig. 55. The deflection is considerably enlarged for diagram purposes.

Location of Maximum Moment in Spar  
From the table directly above:

$$\tan X/2 = \frac{D \cos L/2}{D \sin L/2} = 1.515$$

$$X/2 = 56.6 \text{ degrees} = 56.6/97.9 = .588 \text{ radians}$$

$$X = 113.2 \text{ from Table}$$

As the total distance from the strut to the fuselage is 128 inches it is evident that this point is very near the fuselage as is shown in Fig. 54.

Point of Inflection  
The table states that in the design of the spar, the location of Case A (Fig. 56) must be employed for the overloading rebound of the strut point so far as the outer part of the



Fig. 55.

spar. Both Case A and B have a point of inflection in the spar. It is then necessary to find which is the outer part of inflection. The outer point of inflection of the two Cases will always be that due to the loading of Case II (Fig. 5). This is so because the overloading moment  $M_o$  is less in all cases and the loading rebound, which counteracts this moment is heavier than in Case A, and will reduce the moment to some extent. The position of zero moment is of course a point of inflection.

To determine the point of inflection we make use of the formula which has already been used in Chapter 1. The formula shows that the deflection is the effect of the load and which defines the point of inflection somewhat. This deflection

is due to the fact that our overloading is very large. To withstand this effect we may consider one strut point to be a point of inflection. Air forces pushing up on the overloading cause the beam rebound of the strut point to deflect downward. However, air forces are likewise acting up on the rebound of the strut point. These forces push about equal the overloading forces on our plane. Actually they are a little greater and as near the fuselage they cause the beam to deflect upward, putting the upper flange in tension as is

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Design of Front Spar

Fig. 56.

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The formula employed is:  $M_s = M_s + S + X - W \pm Y$

Case	W	S	X	Y	M <sub>s</sub>	M <sub>s</sub> + S	M <sub>s</sub> + S + X	M <sub>s</sub> + S + X - W	W ± Y
Case A	100	100	0	0	0	100	100	100	0
Case B	100	100	100	0	0	200	300	200	100
Case C	100	100	100	100	0	300	400	300	200
Case D	100	100	100	100	100	400	500	400	300

It is to be noted that the moments as figured in the foregoing table suggested the effect of wind load in increasing the bending stress. The Poisson Equations for calculating these moments could not be applied here unless we had previously solved the drag forces for Case A, so we did this first. It will be pointed out that the drag forces were independent for Case B, and the pressure method applied to the wing leaves for this case only. Case A however is in itself more severe for these purposes of the spar it designs, and the secondary bending stress due to the compression load may be neglected.

Likewise in the table below the true axial load for Case C is unknown as the drag axial load for this case is unknown. We arbitrarily use the axial load of Case B as this is fairly close to what the true load of Case A would be. It is to be noted that the axial load found before is not true due to the lift plus the average drag axial load but is the true axial load of the section. That is, in the left wing lead of \$200 pounds a load of 534 pounds is added to obtain the true axial load at the wing point and 30 inches behind so there are no first drag bay, a drag axial load of 534 pounds is added to obtain the true axial load at the section 60.5 inches and 30 inches behind as there are in the second drag bay.

The properties of the spar section are obtained from the sections as originally designed in Fig. 63 and the standard calculations. The shear stress ratio is figured on a length of span L of 120 inches. In this particular place the maximum moment is so small and occurs so near the fuselage that it is minor and more conservative to take the entire length L. Ordinarily the maximum of Fig. 27-Chapter 4 would be used to determine L. L is then obtained by division.

The Modulus of Rupture and the allowable stress S is found from Fig. 24 of Chapter 4.

Comparison of Moments in Cases									
Case	Leading	Wing	Fuselage	Wing	Fuselage	Wing	Fuselage	Wing	Fuselage
Case A	100	100	100	100	100	100	100	100	100
Case B	100	100	100	100	100	100	100	100	100
Case C	100	100	100	100	100	100	100	100	100
Case D	100	100	100	100	100	100	100	100	100

Comparison of Moments in Cases									
Case	Leading	Wing	Fuselage	Wing	Fuselage	Wing	Fuselage	Wing	Fuselage
Case A	100	100	100	100	100	100	100	100	100
Case B	100	100	100	100	100	100	100	100	100
Case C	100	100	100	100	100	100	100	100	100
Case D	100	100	100	100	100	100	100	100	100

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To be continued in the next issue of AVIATION

## Airplane Spruce

Continued from page 1328

partly for the production of spruce piano soundboards, for landing into other fields of specialized spruce manufacture. In 1921 the Pease firm started exporting spruce piano to England, France and Germany, and during the last War accomplished noteworthy work in supplying aircraft spruce for the American government.

Recently the firm has provided the spruce for numerous European planes including the Ryan monoplane "Sport of the Lakes", the Travel Air "Woolard", winner of the Duke of Devon's, the Travel Air winner of the 1925 Ford flying race, and the Stinson "Trade of Detroit", one of the best planes. The Pease company sells direct to more than 25 of the largest American producers in addition to supplying numerous wholesale spruce distributors overseas.

### Years of Experience Necessary

Manufacturing of airplane spruce is primarily a process of constant selection and elimination, coupled with careful seasoning, rather than of mere sawing of logs. The selective work starts with the choosing of the best trees, taken as soon as possible when the finest fibers are formed, and continues without interruption until the spruce is carefully packed in sections for shipment. Only by many years of breeding is a man equipped to judge properly whether a piece of spruce is of the proper texture, of the correct density, and of sufficient strength for airplane construction. There is no substitute for the human factor in manufacturing spruce. To the untrained a stack of spruce for a wing spar might appear perfect, but to the experienced inspector, hidden defects might be noted which would spoil the spar for the completed plane.

The Pease plant refuses to ship airplane spruce in "the way" without final inspection, then knowing the plane manufacturer to select his own timbers and not make those which he does not want. Every stack of airplane spruce the Pease plant ships out has been repeatedly inspected, and, to the aid of the firm's knowledge and experience, a suitable construction. T. B. Stansfield, plant superintendent, a man of 25 years' lumber experience, and with the Pease company for the past 35 years, directs the activities of a staff of 12 inspectors, each with 10 or more years' experience. The stamp "Stansfield Inspection Firm" on a section stamped by many of the producing companies without question or further consideration a concern will not be a government inspector, and a staff men to examine the lumber, but most of them rely on the Pease "O.K."

### Small Percentage of Log Acceptable

Because of the repeated inspections, the small percentage of the log found acceptable, the complicated air, knot and dry rot, and the packing, the price of airplane spruce is high. But when one visits the plant and observes the conditions care taken in the process, the charges appear reasonable. Furthermore, by purchasing period lumber, the plane manufacturer keeps his factory savings to a minimum all over his freight on this savings. A growing tendency among the manufacturers is to order the plane parts completely manufactured, ready for assembly. The Pease plant is equipped to turn out practically any piece of wing or fuselage frame, correct to size to microscopic measurements. Some plane builders prefer to do their own machining, while others have their timbers cut to approximate sizes.

When a piece of spruce is found for shipment it must pass inspection on the following points:

It must be of the right texture, with specified number of lines to the inch.

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It must have the proper strength characteristics. The ungrained spruce two pieces may be easily alike, whereas the ungrained spruce with distinct grain lines that approximate throwing out the stick.

The stick must be of proper density. Pieces too heavy or too light are thrown out.

The grain must be straight and free from hidden defects. Laboratory tests are made of specimens from the compression and tensile strength. All pieces are inspected in



Slide spruce pieces packed in boxes various ready for shipment.

four ends and both ends. With these rigid requirements in mind, it may be understood why only 3 to 10 per cent. of the log is found satisfactory for planes.

The Pusey company controls large stands of timber, but occasionally purchases selected logs from other concerns. Logs after inspection, are cut into the desired sizes and then put through the kiln, the latter a highly technical process demanding extraordinary skill and care. Spruce spruce is given the same painstaking kiln treatment according to the finest plane working boards.

The spruce timbers are not carefully from logs that have been "checked" to insure proper grain direction. Then comes the next inspection and the working process is well under way.

After an air drying period in the yards, which varies from two to six weeks, the sticks are again inspected, and are taken to the left kiln, heated with steam pipes, and to the right kiln.

In the large ten carload capacity steam kiln, wet and dry heat brings the spruce to the proper moisture content. Dry heat is obtained by steam heated pipes, and damp heat provided by steam jets which spray the timbers at some 20 points along the floor of the kiln. The timbers are stacked on a conveyor that permits the air and steam to circulate freely on all sides of the stock.

Damp heat is controlled in the drying process and dry heat would crack the timbers. It is interesting to note the spruce may be dried to an 8 or 10 per cent. moisture content with a 40 per cent. humidity in the room. Temperature will run at times as high as 145 deg. Fahrenheit.

Produce moisture register the butt and the head of a three separate points in the kiln, thus three-way check log an accurate that conditions are the same in all parts of the kiln. Humidity and heat are both regulated automatically.

Time required to bring the lumber to the proper moisture content varies with the size of the timbers. Government standards are strictly adhered to, the time varying from six to seven weeks for smaller sizes to about 90 days for a four inch piece. The time, however, is a variable factor and often the longer.

Specimens of the timbers, coated with resin and hung that to keep the samples from drying faster than the kiln log, are placed in the kiln and from time to time tested for tension, shear, and moisture content. These samples are weighed before and after select drying to calculate the moisture content, and are examined by the left expert, Walter D. Shaw, to determine if the timbers are "crack-free", the timber being desirable through layers of seasoning. If such size and tension is found, the kiln conditions are changed to a

new part 1 timbers. Stock is dried to the demands of the airplane plane manufacturers, the moisture content varying from 1 to 10 per cent. The sticks are usually dried to 10 per cent. at the point of plane construction.

After kiln drying, the stock again must pass inspection; after kiln drying, the stock is sorted out at the hands of experts, all of whom watch constantly for imperfect pieces. Next comes an air-drying operation, another inspection, and finally the sorting and grading process. On the freight platform the stock undergoes a final inspection, or before it is packed into a container; if it is small pieces. Because of the tedious inspection and the careful kiln drying process, a month or 90 days is the shortest possible time a spruce timber can be taken from the log to the freight car.

But of the completed sticks vary from less than a quarter inch in thickness to the large wing beams which must bear the heaviest of the stress and strain on a plane. Some smaller beams are used, while others serve the side, or strut, pieces.

In view of the quality with which large stands of timber are arriving throughout the United States, it is quite probable that plane manufacturers have given thought to the idea that the spruce supply eventually being cut off. This will require a solution. In addition to the great Olympic forests spruce stand, Oregon has noted millions of high grade stands of high grade spruce spruce just watched.

Many of the large lumber companies in Oregon and Washington are now actively engaged in re-forestation work in cooperation with the Forest Service of the Department of agriculture. Forest service officials predict that proper care a reforestation will ensure ample timber in the Pacific Northwest for a half-century period.

## The Fokker F-10

Continued from page 1297

meeting of a rubber chord, in tension, attached to the seat. The seat bolts in any desired position and should it be too high, the compact releases the cord and the rubber chord slides, slowly lowering the seat and until it is in the desired position, where it is locked in place. Should the seat be too low, the compact raises himself slightly, taking the weight of the seat and at the same time raising the cord. The tension in the rubber chord raises the seat until it is in the



Side view of the F-10 showing the full length cabin structure.

desired position, where it is again locked. The seat on the right is not adjustable, as the plane is intended to be flown, with necessary conditions, from the left side.

The right pilot, on the right, also acts as mechanic, radio operator, and perhaps observer for the passenger. For this reason the more flight instruments are mounted on the left side of the instrument board. These include a Pioneer turn and bank indicator, Pioneer altimeter, Consolidated magnetic compass, and Pioneer air speed indicator in the center of the instrument board. The speed on the right is controlled by the fuel system controls, while in the center are the

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engine controls and instruments for the center engine. Below the center of the instrument board are all the engine controls, grouped together so that they can be moved together or separately.

The side engines have their instruments mounted on small panels on the inner side of the engine nacelles, below the wing. The panels are fitted with lights, so that they can be seen at night. These panels are glider visible through small windows in the covering at the side of the cockpit. The covering of the cockpit flares into the wing, with the sides and roof of flat safety glass. The panels can be slid in their frames so that the pilot can have better vision, if necessary, in bad weather. However, vision forward, upward and to the sides is excellent. Looking downward, the pilot can see the wheels when landing and if necessary can open the covering to look to the rear.

Goodpastor uses 44 in. by 10 in. are mounted on floats which are fitted with roller bearings. The track between the wheels is 15 ft. 8 in., which is ample width for a plane of this size. In addition, the wheels are fitted with brakes so that the plane can be maneuvered on the ground in a very small area. The brakes are individually operated by two handles, one for each wheel, mounted below the instrument board in the cockpit. The handles are attached to cables leading to the wheels, with the brake link in, is supported by three struts, two are hinged to the lower fuselage members, while the third, reinforcing the shock absorbers, is vertical and attached to the forward wing spar. The shock absorber must consist of three main members, two of which are welded to the wing. Endless rings of laminated shock absorber sheet are laced between these members to transmit the load from the wheel to the wing. As there is no radial bracing in the wings, they can easily be repaired. The shock absorber has a long stroke and is said to be ex-

ceptionally soft in landing. This type of landing gear does have the advantage of having the shock carry the load of the wing and the engine nacelle directly where the plane is on the ground. Fenders are provided above each wheel to prevent dirt or stones from being thrown into the propeller.

The engine nacelles are each mounted outside the wing and of the landing gear, with this strut forming part of the bracing of the engine nacelle. The engine mount brackets the lead to the forward and rear wing spars by a frame consisting of four lengths of steel tubing, welded together at intervals by other tubes connecting it to the wing. There is



Front view of EDO Youngster biplane.

two points of attachment on the forward spar and one on the rear spar. A ring type of engine bracket is welded to the front end of this frame and circular steel tubes are welded to the bracing members to form the frame for the struts of the shock absorbers covering. The nacelle is not stressed and the engine is fitted with a radial type of duct to fan the engine as well as regulate the cooling.

The engines are Pratt & Whitney Waspas developing 80 hp. at 2000 r.p.m. They are nine cylinders, direct drive, w-

and radial, fitted with three-blade Standard Steel propellers. It was found necessary to use three-blade propellers to get three proper clearances. Behind the engine, and set in the nacelle so as not to destroy the streamlines, is an exhaust ring. It has two openings at the bottom for an exit of the exhaust gases. The gases of the center engine are carried below the fuselage with the rear portion of an exhaust pipe fitted with an air scoop. Air enters the scoop and comes in contact with the hot exhaust pipe before going into the exhaust. Each engine is fitted with an Elicopas fuel meter, starter and an addition there is a booster pump in the fuselage controlled from the instrument board. It is fitted with a selector switch so that it may be used in using any of the engines. Behind each engine is a fire oil separating it from a 10 gal. oil tank. The fire walls of the forward engines are each set in the nacelle diagonally, coming from the forward end on the inner side, to the rear at the outer side. On the inner side of each engine nacelle, passing through the fire wall, is an air scoop taking in air that passes over the oil tank, thus cooling the oil. The

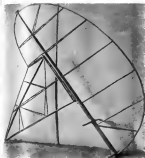


Diagram of fuselage and radiator of the EDO Youngster.

ducts for an opening of about four inches in diameter as is necessary to permit the exit of the cooling air. The center engine is provided with a copper coil inside the covering to cool the oil.

Standard equipment on each engine includes an engine driven pump to draw gasoline from any of the three 55 gal tanks in the engines. The fuel system normally works by gravity, but in addition to the engine pump there is, as an added provision, a vacuum pump in the nacelle, operated by a line between the engine nacelle. Two of the fuel tanks are mounted in the center nacelle, one above the other, while the third tank is mounted in the wing, to the right of the fuselage, between the wing spars. This tank is fitted with a large check valve.

The wing is of standard EDO design and is of the same size as that used on the standard EDO Youngster, though it is somewhat heavier to carry the greater load. It is a combination of wood construction, covered with all wire bracing. Two

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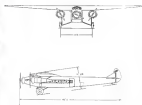
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main spar are of the box type with laminated sheet mahogany and balsa plywood webs. To provide for the taper of the wing in thickness, the number of laminations of the sheet mahogany is decreased towards the tips. The ribs, balsa plywood webs with solid rag wings and all of them were treated for lightening, except those of the compression members, which are solid. The covering is of light plywood glued and nailed to the supporting structure. As has been mentioned, the wings are loaded for rolls and, in addition, are fitted for the installation of navigation lights.

The ailerons are similar in construction to the wing. They are of the slotted type, hinged to false spars in the wing



These views showing of the Fokker P-20

The hinges are on the upper surface of the wing and let the aileron and the wing have flat surfaces on the side facing the gap between them. Thus, when the aileron is down, there is a definite opening in the lower surface, increasing in drag, and when the aileron is down, the gap is closed, decreasing the drag. Hinges are attached to both the upper and lower surfaces of the ailerons and connected to cables running to the cockpit. In addition, there is a short cable attached to the upper surface, preventing the aileron from being lowered too far.

Cables are used for the control of the tail surfaces. They are carried inside the fuselage, with inspection covers provided at all critical places in the system. The cables pass over the corner of a pulley near the tail and continue to the quadrant of the control surfaces. The horizontal stabilizer is adjusted by a handle in the cockpit, between the pilot's seat, connected by cable to a worm gear actuating a bell crank. A stabilizer is attached to the bell crank and the ends of rollers and rubber are balanced, and only a single roller is used. All of the tail surfaces are of welded steel sheet covered with fabric. In general, the surfaces consist of a large diameter tube forming the main structural mem-



Side view technical drawing of the Fokker P-20.

ber to which tubular ribs, of Warren truss construction, are welded. These ribs are braced by another tube bent to conform with the outline of the control surfaces. The horizontal surfaces are of semi-monocoque design, while the vertical surfaces are externally braced. This type of construction is very light and can be produced very cheaply.

The following specifications on the Fokker P-20 were supplied by the engineering department of the Atlantic Aircraft Corp.

Length	26 ft.
Wing span	32 ft. 6 in.
Wing chord	12 ft. 6 in.
Maximum chord	12 ft. 6 in.
Area of wing	677 sq. ft.
Area of ailerons	61 sq. ft.
Total area	738 sq. ft.
Area of stabilizer	100 sq. ft.
Area of elevator	30 sq. ft.
Area of rudder	10 sq. ft.
Area of fin	6.5 sq. ft.
Area of tail	10 sq. ft.
Weight empty	4,500 lb.
Pay load	2,100 lb.
12 passengers, 100 lb. each	1,200 lb.
Mail, weapons or baggage	900 lb.
Load pay load	2,600 lb.
Fuel, 5 gal. in 1 hr.	300 lb.
Oil, 5 gal. in 1 hr.	150 lb.
50 gal. of oil	350 lb.
Deposited load	4,500 lb.
Empty weight	11,000 lb.
Engine	11,000 lb.
Wing, 3 at 400 lb.	
Power loading	14 lb. per sq. ft.
Power loading	5.35 lb. per sq. ft.
5 engines	2 engines
High speed (max level)	148 m.p.h.
High speed at 10,000 ft.	135 m.p.h.
Climbing speed at 10,000 ft.	135 m.p.h.
Climbing speed (max level)	55 m.p.h.
Service ceiling	15,000 ft.
Steady climb	20,000 ft.
Climb (max level)	1,400 ft.
Climb (10,000 ft.)	600 ft.
Time to climb 5,000 ft.	4 min.
Time to climb 10,000 ft.	10 min.
Time to climb 15,000 ft.	15 min.
Turning angle	4 in. or 600 in.

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sold during spring term. The field is also to be drugged and leveled. A. E. Warner is chairman of the field equipment committee in charge of the work.

Oklahoma City is to have a place on the fourth Ford bi-lubility tour. Paul Braniff, who flew an Eagle solo, at Oklahoma, in last year's tour, has entered the Oklahoma Air Club's Stinson-Detwiler in this year's tour.

Handfuls of mail have been received at the airport in San Antonio, Tex., where the airport is being developed by Bob Cantwell partner with his landowner, the American Air Club, and operator and of field investor, has been flying a Cessna since the world war. The plane was ready purchased by Halderson.

Leaking tanks which will accommodate large multi-engine planes will be provided soon on air line landing near the home city from all directions, according to plans of El Paso and Guthrie. These cities are working on developing the air field. At El Paso arrangements have been made for a field to be used partly by the government and by the city. Guthrie has arranged for a field one half mile long north and south and a quarter mile east and west, Loran A. Hays, secretary of the chamber of commerce, has suggested. The new field is located on state highway No. 24.

**Minneapolis, Minn.**  
By E. S. Lathrop

The Wisconsin Flying Club's new Lincoln-Pipe biplane, powered with an OX-5, was flown recently from the field at Lincoln, Neb., to Minneapolis by Elmer Bruns, pilot of the club, with Frank Darnell, treasurer, as passenger. The distance covered was 525 mi. and was made in 5 1/2 hr. flying time. The club is composed of 22 members and is on an equal share in the corporation.

An American Eagle biplane, piloted by Louis H. E. Kel, of the 1926 Observers Squadron of the Alabama National Guard, and carrying N. J. Bond, was a recent visitor at Milledale Field. Mr. Bond is making a survey of airports throughout the Middle West with a view toward establishing standard air transportation.

Mrs. John Ford, "flying grandchild," landed at the new airport recently after traveling 2,160 mi. by air to visit her daughter in Milwaukee. Mrs. Ford's home is in Sydney, Australia, and she had arrived recently in San Francisco from Australia. The entire distance from Oakland to Milwaukee was negotiated in 25 hr.

The "Mackay-McIntosh," a Fairchild, and a Ryan were placed around 22 passengers recently to Detroit for the 41st American Air Show in that city. The Fairchild plane was piloted by C. B. Chamberlain and carried Elmer O. West, president of the Western Aircraft Corp. and owner of the plane. H. H. Kingston, Arthur Pitt, and Walter Preussner, Tex. Ryan plane was piloted by Elmer Lathrop and carried Ed Walters, Redcliffe Pelet, Fred. Ellis, and William Bruns. The Mackay-McIntosh was piloted by John Miller and Thomas Hamilton, president of the plane company, and William Pelet and Eugene Gilchrist as passengers.

**Salt Lake City, Utah**

The city commission has voted \$5,000 for improvements on the local airport. This was done on the recommendation of Henry L. French, city commissioner of public and police property. His estimate called for nearly \$20,000 in work after considerable discussion it was agreed to keep the expenditures within \$5,000. Of this sum, \$17,470.00 will be paid for a tower, a water main will cost \$1,000.00; drain pipes \$200.00; value of fuel, \$1,000.00; equipment, \$200.00; road work \$1,000.00; fuel \$1,000.00; sanding, oiling and painting \$200.00.

The air express service to St. Paul, Minneapolis, and St. Louis added to the list of the American Railway Ex-

press Co. brings the total of states on air express lines to 35, in 1928, general agent for Salt Lake, says. He also said that Salt Lake is now in seventh place in the number of air express shipments handled. Salt Lake was ahead of such cities as Oakland, Dallas, Boston, Kansas City, Omaha, and Oklahoma City, he reports.

Salt Lake City, pivot point in the Western airway system, has been included in a stopping place for the first time, or lower, in 35-day trip covering all the principal cities of the United States and Canada, and also touching Japan and Cuba points, according to word received recently from the American Airways Tour, which is sponsoring the project.

In addition to pilots, navigators, and managers, 200 passengers will be carried in 55 multi-engine planes. This tour will leave Washington, D. C., June 15 and will and July 24 at the rate of 100 cents. Something more than 20,000 mi. will be covered.

**Minneapolis, Minn.**  
By E. S. Lathrop

The Arrowhead Aircraft Co., Minneapolis distributor in Minnesota, South Dakota, and Montana, expects a demonstration plane during the latter part of May, that is to be used in the open flying association here.

Shortly after the Grumman was received in January, the United States Aero Co. of Danvers, Ia., former manufacturer of the Monoplane, was organized, which handled the design and distribution of an airplane company and the Mono Aircraft, Inc. of Madison, Wis., is producing the Monoplane at present and has included a number of improvements in its construction. A new engine is also under production and is considered as being successful according to the various tests. Elmer H. Gilfill is the manager of the Arrowhead Aircraft Co. and Wm. Day Prindle is the chief pilot.

The Minneapolis Journal is sponsoring a model building of flying contest that is of interest to the youthful aviation enthusiasts in Minnesota and several neighboring states. Mr. O. W. Brown, an instructor in the public schools of Detroit, Mich., and secretary of the Airplane Model League of America, is giving instructions through the pages of the Journal on the points of constructing the miniature planes.

Two of the winners in the contest, the date of which is not yet decided, will go to Detroit to compete in the contest. Several prizes and other awards are being offered in the contest of commercial aviation have endorsed the tournament and are offering their assistance in making it interesting to all concerned.

**Los Angeles, Calif.**  
By Charles F. McFarland

Dyer Airport added two new planes to its equipment during the past month and the purchase of a Whitehead Ryan plane is now completed. The latter would be used for short flying trips.

Webb and Ed. Hefley of Longmont, Colo., well known aviators, recently visited at Dyer Airport. They have been back to Colorado to establish an airport. An L-6 Standard by bought from Charles Dyer will be used at their new field.

**Worcester, Wash.**

The P. O. (Hed), Gov. police officers made their first parachute jump at Parnassus Field here recently. Both are members of the 21st Observers Squadron, Air Corps, Bingham. The first jump from a plane piloted by Louis. (Hed) G. R. R. commander of the field. Staff Darnell, deputy commander, also flew and over the Columbia River and dropped 190 ft. from there. He managed to become himself from the air and return to land. Jack Tenscher, traffic officer, had

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